

Likewise, these newly developing professionals should begin to see that social workers, as valuable members of the health care team, are knowledgeable about community resources and function as mobilizers of community awareness around an identified problem. They serve as bridge-builders and have a value system that stresses the growth of the individual, his or her potential for change, and the right to self-determination. Social workers can often act in a consultation role as enabler, teacher, counselor, facilitator, and change agent.

Thus, we have seen that the AHEC program is a means to expose diverse health care students to a multiplicity of educational objectives. Not only does it contribute to the future social worker's preparation, but it also assists in developing a broader perspective for other health care providers

who should be exposed to the special expertise that social workers can bring to a clinical or community situation. And finally, through the AHEC process, practicing social workers can more easily learn needed new skills and feel less isolated when serving in rural or urban underserved areas.

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## Feasibility of Screening Young Children in Day Care Centers —a Preliminary Investigation

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#### Synopsis.....

*A preliminary investigation of a method of providing health screening in day care centers was conducted. Ninety-four children, birth to 6 years, attending two day care centers were screened for health and developmental problems. A nurse trained day care staff to conduct the screenings, supervised their activities, rescreened children with*

*questionable results, and conducted an interrater reliability study as well as referral and followup activities. The nurse also did assessments of environmental characteristics of the programs, their policies, procedures, and activities and assessed staff and parent information needs concerning child development, health practices, and health needs of children.*

*Thirty-nine problems were identified in 33 children. Followups of 29 problems were completed, and 16 of these were verified. The 29 problems resulted in a total of 35 visits to primary health care providers. Among parents of children with verified problems, only three had been aware of the problem. The overreferral rate was 47 percent. Interrater percentages of agreement on most screenings were more than 80 percent.*

*The findings suggested that the screenings were feasible with specific modifications. The screening activities were acceptable to parents, their physicians, and center staff. Centers were responsive to staff and parent needs identified in the screening process but not to recommendations for change within the environment and in operating procedures, partly because of fiscal implications. Screenings were adequate to identify a number of health problems prevalent in children under 6, and interrater reliabilities were acceptable.*

**E**ARLY CHILDHOOD PROGRAMS, which include day care centers, preschools, and nursery schools, offer

a rich medium for providing health care to large numbers of children under 6 years of age. Al-

though exact numbers of children attending early childhood programs are not available, reports from various agencies allow speculation concerning the number of children in these programs. B. Weiss of the American Montessori Educational Center stated that the 1983 enrollments numbered 39,500 children in only 510 centers. According to Y. McClendon, Program Director for Omaha Head Start, Head Start in 1984 had approximately 455,000-460,000 children aged 3 to 5 years attending its programs. The 1976 National Child Care Consumer Study conducted by the Department of Health, Education, and Welfare showed there were 3 million children in nursery, preschool, day care, and Head Start programs (1). In 1982, the U.S. Census Bureau reported that nearly 1 million working mothers use some type of group care center for their children (2). Furthermore, many of these mothers probably use group care for more than one child. These numbers can only be expected to increase with the continuation of various economic and social trends that are influencing the placement of young children in these programs.

Many children do not regularly receive health care, and private health providers do not regularly conduct all the essential screening examinations; therefore, problems are missed (3-5). Periodic screenings in the early childhood programs can monitor, and possibly reduce or prevent, common health problems of children (6, 7). Conditions that can be monitored include vision, hearing, speech, behavior, development, and dental, immunization, and nutritional status. Other problems can be monitored as well. For example, children who are at risk for abuse and neglect or are victims may be identified. Through these child care programs, parents are accessible and suspect parenting behavior can be observed and identified. In addition, parents can supply health data on their children and can identify their own parenting educational needs.

Prevalence rates have been reported for many common problems in children.

*Vision defects*—12 percent. Among 1- to 4-year-olds who need treatment, more than 70 percent do not receive it (8).

*Hearing loss*—10 percent of children from birth to 11 years. The rate has been reported as high as 13 percent in all children under 17 (8, 9). Hearing loss is the most common sequela of acute otitis media, which has a prevalence rate of 15-20

percent in 1- to 7-year-olds and is one of the most common infectious diseases of childhood (10, 11).

*Development problems*—reported at 6-7 percent and at 12-14 percent in low birth weight infants (12,13). Specific conditions such as cerebral palsy and minimal brain damage are often not fully manifested until age 2, and perceptual psychomotor problems, until 3 or 4 (14, 15). Speech and language development delays are found in 5-10 percent of children beginning school (16).

*Dental problems*—16 percent of 1- to 5-year-olds with decayed teeth. Half of these children are in families with incomes of \$15,000 or more (3).

*Immunization*—The percentage of children aged 1 to 4 who are immunized for specific diseases has declined nationally for both initial and booster inoculations (17). Early childhood programs recently have been implicated in changing patterns of specific infectious diseases, and these are affecting both children and the adults with whom they are in contact (18).

Periodic health monitoring in early childhood programs can detect risks and problems within the programs themselves; such assessment could include the policies, procedures, and physical characteristics of the facility and caregivers' behaviors and activities. Despite licensing requirements for day care centers in every State, basic health and safety deficiencies exist. A national study of 52 centers' licensing requirements found that more than one-third did not have a health coordinator available, one-fourth did not have written health and emergency guidelines, one-half did not have nutritional education services, and more than two-thirds did not have a dental health education program. Fewer than one-half the States address the use of lead paint in the day care facility or require fire extinguishers, smoke detectors, or fenced playgrounds. Only one-half the States require day care staff to be trained in first aid (19). Also, licensure of preschools or nursery schools is not required by every State; therefore, the deficiencies in these schools may be more numerous than in licensed day care centers. Moreover, early childhood programs do not ordinarily have health services or providers available to them.

Gaps, duplications, and fragmentation exist in the health services available to children under 6 years. Among the major screening services established by legislation—Early and Periodic Screening, Diagnosis, and Treatment Program (EPSDT),

Head Start, and State Services for Crippled Children (SCC)—there exist gaps caused by financial eligibility requirements, insufficient coverage, and lack of followup activities. These services miss children from middle- and high-income groups. Consequently, those children may not receive periodic health care nor be methodically screened when they do seek medical care.

SCC in Nebraska holds "screening clinics" to evaluate only children who are suspected of having handicaps. Moreover, they must be referred by physicians, hospitals, school systems, or the Children and Youth Project, and this may well be the case in other States. Consequently, many children may be missed who have unidentified problems (20).

Head Start, which has a waiting period to enroll, and the EPSDT program are available only to children of low-income families. According to a 1982 DHHS working paper, only 25 percent of those eligible for EPSDT received examinations (21). Furthermore, in some States the EPSDT program has no followup activities that would encourage parents to seek treatment or complete referral. EPSDT covers a maximum of 14 screenings between birth and 21 years. This number may not be adequate to detect the potentially preventable conditions of children under 6 years. For example, a child can be expected to have between three and six upper respiratory infections a year during the first 7 years of life (22). Moreover, utilization rates are affected by monthly variations in patients' Medicaid eligibility and providers' reluctance to accept Medicaid patients.

Significant savings in health care costs are associated with early identification of health problems (23-25). No less important is the personal well-being of one person as a primary reason for the early identification and treatment of problems. In a 1974 normative study of EPSDT, Brett and coworkers concluded that \$43 billion in 1976 dollars could be saved over a 20-year period through reduced mortality and morbidity (23). The program could reduce costs for physician visits, hospitalization, and rehabilitation associated with chronic diseases. In a study of the impact of EPSDT on child health in 1980, Irwin and Conroy-Hughes concluded unequivocally that periodic screening in a representative sample of 1,831 children was associated with a decrease of almost 30 percent in the incidence of abnormalities requiring care on rescreening (24).

A systematic method is needed to give periodic health services to children in early childhood

programs. This investigation was undertaken to determine the feasibility of one method of health screening in day care centers that has not been tested or described in the literature. These specific questions were studied:

1. Is the method acceptable to children and their parents and to staff and administrative boards of day care centers?
2. Is the overall method cost-effective?
3. Can nonprofessional day care staff be trained to conduct screenings with acceptable interrater reliabilities?
4. Are the day care centers responsive to the health-promoting activities of the method?

## Methods

Two consenting licensed day care centers, referred to as Day Care A and Day Care B, were selected from 75 day care and preschool programs in the Omaha area. These two centers constituted the population of this investigation. Day Care A was smaller, with an average enrollment of 30 children, 42 percent of whom were nonwhite. Day Care A was located in a deteriorating, middle-class, residential area. It was a private combination day care-preschool center, and the director had been trained by the operator of a number of these centers. The education levels of the staff ranged from high school completion to master's preparation. Day Care B, also a private center, had an average enrollment of 100 children and was located in a primarily middle- and upper-class area of the city. Four percent of the children attending were nonwhite. The director held a master's degree in child development, and staff members had 1 to 4 years of college education. The monthly fees were one-third higher at Day Care A than at Day Care B.

Purposive sampling was used to obtain the parent-child sample. Center directors and all parents of the children attending the centers were asked to participate in the investigation. They were given 2 weeks to complete and return the consent forms before commencement of screening activities; no children were subsequently added to the sample. The forms contained a detailed explanation of the design and procedures and gave assurances of anonymity and confidentiality of data, except in cases of legal conflict.

At the time of sample selection there were 134 full-day and half-day eligible children at both day care centers. Parents of 102 children agreed to

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participate and, of these, 92 completed all required screenings and 2 others completed all but the developmental screening. The dropouts occurred because these families moved out of the geographic area. No screening results are reported for the eight dropout children because they did not complete all screenings.

The 26 children at Day Care A and 68 at Day Care B were all under 6 years, and the majority were 2, 3, or 4. The Hollingshead Two Factor Index of Social Position was used to verify that there was representation from all social groups. Of the 83 participating families, 75 percent at Day Care A and 88 percent at Day Care B provided information on members' occupations and education. On a 5-position social scale, with 5 being highest, the majority of families at Day Care A scored in the middle, while the majority at Day Care B scored in the middle and higher positions. All social positions were represented at both centers.

## Procedures

Noninvasive standardized screening procedures were used. Health conditions screened by tests were those most prevalent in the under 6 population: growth, dental, vision, hearing, behavior, and development. Recommendations of authorities in screening provided the basis for selection of screening tests and referral criteria. The standardized tests were suitable for use by nonprofessionals, and reliability and validity results were acceptable. The study protocol facilitated use of the child's and family's routine health care provider by linking the referral and followup procedures directly to that provider, thereby enlisting cooperation from health providers in the community.

The health and developmental screenings were conducted by a nurse-investigator and day care staff (table 1). The nurse trained staff to administer screenings, supervised their activities, re-screened questionable results, conducted referral and followup activities, and analyzed interrater reliabilities. The nurse held formal training sessions for groups of two to five staff at each center. The sessions consisted of oral and written instructions, demonstrations, and repeated demonstrations. Following the training for each procedure, all qualifying children were screened before proceeding with the training and subsequent screening using another procedure. Staff members were directly supervised during all hearing and vision screening and intermittently during the growth, dental, and developmental and screenings. A second staff member cared for the children during the screening periods.

Because interrater reliabilities for nonprofessionals in day care centers had not been reported in the literature, they were obtained for weight, height, dental, hearing, and vision screenings on a 30 percent random sample of all children screened; a nurse and day care staff were the raters. The percentages of agreement between the raters were as follows:

Screening	Percent of agreement <sup>1</sup>
Height and weight . . . . .	95
Dental . . . . .	77
Hearing . . . . .	74
Vision . . . . .	100
Development:	
Staff and parent PDQ . . . . .	76
Staff and nurse DDST <sup>2</sup> . . . . .	100
Staff PDQ and DDST <sup>2</sup> . . . . .	83
Parent PDQ and staff DDST <sup>2</sup> . . . . .	96

<sup>1</sup> Agreement was an overall result (fail or pass).

<sup>2</sup> Interrater reliabilities are for DDST only at Day Care A. NOTE: PDQ Prescreening Developmental Questionnaire; DDST Denver Developmental Screening Test.

The nurse was not used as a rater for the Eyberg Child Behavior Inventory (26) or the Prescreening Developmental Questionnaire (PDQ) because they require screeners who know the child well; therefore, these tests were completed only by parents and the staff member who was most familiar with each child examined. The nurse and staff formed the rating team for the Denver Developmental Screening Test (DDST) only at Day Care Center A.

The vision, hearing, dental, behavior, growth, and development of all qualifying children partici-

Table 1. Health and development screening measures for children in two day care centers

<i>Screening and procedure</i>	<i>Purpose</i>	<i>Subjects</i>	<i>Screeners</i>
Vision—Tumbling E or Allen picture cards.	Test central visual acuity.	3-, 4-, 5-year-olds.	Day care staff
Hearing—pure tone audiometry.	Test for peripheral hearing loss.	3-, 4-, 5-year-olds.	Day care staff
Dental—visual inspection.	Detect tooth decay.	All children.	Day care staff
Behavior—Eyberg Child Behavior Inventory.	Identify children with behavior disorders.	Only suspect children.	Day care staff
Growth—height and weight, head circumference.	Detect malnutrition, congenital malformations, endocrine and genetic disorders.	All children. Head circumference—all children under 2 years.	Day care staff
Development—prescreening developmental questionnaire (PDQ).	An abbreviated assessment to identify children needing a DDST evaluation.	All children.	Day care staff and parents
Development—Denver Developmental Screening Test (DDST).	Identify children with possible developmental delay.	Day Care A—all children, Day Care B—those failing PDQ.	Day care staff and nurse
Home environment—home screening questionnaire.	Identify children at risk for developmental delay.	All children's homes.	Parents
Environment, policies, and activities of the day care center.	Identify presence or absence of health-promoting features.	Day care programs.	Day care director and nurse
Education needs—health promotion needs questionnaire.	Identify information needs in child health development.	Parents and day care staff.	Nurse
Health and development status—history form.	Identify health problems, unobvious handicaps, immunization needs, family health, and personal data.	All children.	Parents

pating in the investigation were screened. The Home Screening Questionnaire, used to identify children at risk for developmental delays due to negative environmental influences, was completed by all parents at the beginning of the investigation.

When a test identified a child as having possible problems, the center director informed the parents with a referral and followup form that had been completed by the nurse. The form identified the test, test results, and administrator of the test and advised parents to take their child to their physician, dentist, or other usual health provider for further evaluation. The followup portion, to be completed by the health provider, asked about findings of the evaluation, prescribed treatment if any, followup appointments, and whether the provider or the parents had previous knowledge of the problem. The parent was asked to return the form to the center director. The nurse made up to three calls to encourage completion of the referral and followup procedure.

Additionally, the nurse administered three investigator-developed tools to identify other factors related to health needs or problems of children. The Health Promotion Needs Question-

naire identified the educational interests and needs of parents and center staff related to child care and rearing. The Health and Developmental History identified children who needed immunizations and additional screenings not in the study protocol and those who had unobvious handicaps or health problems. It provided information on developmental milestones and family history. These forms were given to parents at the beginning of the investigation.

The third form, the Day-Care Environment, Policy, and Activity Assessment (DEPA), in checklist format, identified the presence or absence of health-promoting features of the center, such as staff-parent interaction, staff teaching of hygienic practices to children, staff child-care practices, emergency procedures, isolation procedures for sick children, building characteristics, and staff-to-child ratios. The form also mentioned the presence or absence of basic health education for the children concerning nutrition, dental and physical hygiene, and behavior. In addition, the DEPA assessed the centers' policies and procedures to determine whether they provided for monitoring inappropriate caregiver behaviors, for assuring

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adequate funding, and for conducting annual reviews of the philosophy, goals, operational procedures, and facilities of the agency.

The assessment items went beyond State guidelines for licensure of day care facilities and were based on the Standards for Day Care Centers developed by the American Academy of Pediatrics (27). The DEPA was used jointly by the director of each center and the nurse at the beginning of the investigation. A pretest of the DEPA at four different early childhood programs yielded an 82 percent agreement rate between the individual item responses of two staff members at each of the centers. In the current investigation the results of the DEPA and Health Promotion Questionnaire and corresponding recommendations were transmitted in a summary report to the centers' directors for their use in formulating educational offerings for parents and staff and in changing the program's environment, policies, and procedures.

## Measures

Acceptability of this early intervention method was determined by the number of programs contacted before two consented to participate, interrater reliabilities (using percentage of agreement) on screening tests, proportion of parents in each center who agreed to participate, percentage of parents who completed tools and followups, and by the cooperation of the directors and staffs of the centers. The centers' responsiveness to results of the DEPA and the Health Promotion Needs Questionnaire was evaluated by the number of educational programs offered and number of changes made in the program's environment, policies, practices, and procedures relative to the number of problems identified in those areas.

Costs were determined by calculating total costs of the project, cost per child screened, and cost per problem identified and also by comparing

these costs to an alternative method that uses a non-professional aide who would be employed by the screening program. Effectiveness was evaluated by examining referral, overreferral, and prevalence rates in the given population of the two day care centers and the number of problems previously unknown to parents. Overreferral rates were a validity measure.

## Findings

The intervention method was acceptable to parents, their physicians or other health care providers, and the staff at both facilities. The first two programs contacted consented to participate. The participation rate of eligible children was 70 percent. Parents in both centers were cooperative; the return rates for completed forms was 78 percent, and for followup activities, 74 percent. Parents took children for 35 visits to primary health care providers and no primary provider was bypassed by the referral and followup procedures.

Thirteen day care staff members were trained to conduct screenings. The advantages of using day care staff included the children's decreased anxiety during screenings and the staff's ability to sort the children for the various screenings. Some problems were encountered with the use of staff in conducting the screenings. They did not consistently complete the screening procedures within the preestablished periods, they did not consistently follow the screening procedures without direct supervision, and they did not always accurately record or interpret the results. Day care staff experienced the most difficulty in learning the correct procedures for graphing measurements on growth charts, in accurately judging the children's responses to audiometric tones, and in interpreting the audiometric testing results for referral or no referral.

Difficulties were also encountered in correctly placing the tape measure for head circumference, consistently removing children's shoes before height and weight measurements, visualization of the scale dial from a position directly above it, correct occlusion of the opposing eye during visual testing, and selecting the correct line when testing from the Tumbling E chart. Although day care staff were eager to participate in the screenings, we felt these problems affected some of the interrater reliability results. The hearing, dental, and staff-parent PDQ interrater reliability scores were lower than recommended, but the remaining scores were above or close to the recommended level of 90 percent (28).

Table 2. Summary of screening results for children in two day care centers

Screening measure	Children screened	Problems referred		Followup		Overreferral <sup>2</sup>		Prevalence <sup>3</sup>	
		Number	Percent	Number	Percent <sup>1</sup>	Number	Percent	Number	Percent
Growth <sup>4</sup> .....	94	3	3	2	100	0	...	3	3
Dental.....	94	17	18	11	65	9	82	2	2
Hearing.....	58	13	22	12	92	3	25	9	16
Vision.....	74	5	7	4	80	2	50	2	3
Development.....	92	0	...	0	...	...	...	...	...
Behavior.....	9	1	11	0	...	...	...	...	...

<sup>1</sup> Followups completed.  
<sup>2</sup> False positive results.

<sup>3</sup> Verified problems in the population of the day care centers.  
<sup>4</sup> One child was receiving treatment for the problems and did not need followup.

The screenings identified 39 problems in 33 children (table 2). Most referrals were for dental and hearing problems. The high rate of hearing referrals could be attributed to the screenings being conducted in the winter months when upper respiratory infections peak. Followup was completed on 29 (74 percent) of the 39 problems, and 16 (48 percent) problems were verified. Parents had previously been unaware of 13 (81 percent) of the verified problems of their children.

Of the children with verified problems, nine had undetected hearing problems or middle ear infections, or both, two had unidentified vision problems, and two had unknown cavities. The parents of two children were aware that their children were overweight, but they had not previously sought professional help. A child with a head circumference greater than the 95th percentile was under care and, therefore, the parent did not need to complete followup. The families of children with the 16 verified problems ranked in the first four social positions, as the following tabulation of the problems indicates:

Problem	Social position				
	I	II	III	IV	V
Growth.....				1	...
Dental.....			1	1	...
Hearing.....	2	3	3	...	...
Vision.....		1	...	...	...

NOTE: Not all families provided information on social position.

The health histories provided helpful supplemental information on the children. Nine percent of the children who were referred had maritally disrupted families. Others had histories of allergies and frequent respiratory infections. No homes were identified with the Health Screening Questionnaire (HSQ) as requiring specific intervention

other than parent counseling in areas such as providing children with age-appropriate toys. All children identified as suspect on the HSQ subsequently passed the Prescreening Development Questionnaire.

Followup activities consumed great quantities of the nurse's time. Numerous telephone contacts were required to determine whether parents sought medical care and the results of that care. Most parents completed the referral and followup procedure (table 2).

The overreferral rate for all screenings was 47 percent. The high rate was largely attributable to the dental screening results and arose from difficulties in differentiating dental decay and stained fissures. If dental referrals are omitted, the overreferral rate was 24 percent.

Because staff of most screening programs do not conduct followup activities, it is difficult to find comparative data for preschoolers. Overreferral rates of 55 percent have been reported for hearing tests of school-aged children (29) and rates of 36 percent for vision tests of preschoolers (30). Rates for dental, vision, and developmental conditions observed in this study were lower than those reported in the literature, while the prevalence of hearing problems was higher, and the rate of growth conditions was within the reported range (3,8,9,31,32).

Major areas within the centers identified on the DEPA form as needing improvement were the provision of more stimulating environments, specifically using light, color, and pattern; formulation of policies requiring staff to take first-aid and CPR training, to maintain health records on program staff, to keep current telephone emergency numbers for children, to adopt hygienic measures to prevent transmission of infections, to use a system to monitor caregiver behaviors; and

to conduct annual reviews of the program's philosophy, goals, procedures, and facilities. Only one change was made in response to the DEPA results. That change involved maintaining updated emergency telephone numbers on children's records.

The needs identified by program staff and parents on the Health Promotion Needs Questionnaire were almost identical. They included effective ways to discipline children, to help children make moral decisions, to improve children's self-image, and to handle children's emotions. Six staff inservice and four parent education programs were subsequently offered by both centers on topics identified by the questionnaire.

A time log kept by the nurse during the investigation showed that a total of 51 trips to the two centers were required. The nurse spent 105 hours in training staff, supervising screenings, and completing paperwork; an additional 17 hours were devoted to the interrater reliability activities and calculations. The day care staff required 9 hours of formal training and approximately 50 hours to complete the screenings.

The costs of this investigation are compared with an alternate method in the following table.

<i>Item</i>	<i>Study method</i>	<i>Alternate method<sup>1</sup></i>
Cost of project .....	\$1,282	\$1,065
Cost per child .....	14	11
Cost per verified problem .....	80	66

<sup>1</sup> Alternate method uses a screening aide.

This summary of the costs does not include those incurred in conducting the interrater reliability study. The nurse's salary was calculated at a rate of \$11.50 per hour, or \$25,000 per year. Her salary for this investigation was \$1,207, which was the major expense of the project. Paper supplies cost \$71 (\$.76 per child), and \$4 was spent for miscellaneous paper supplies. No equipment had to be purchased because the needed items were available through the university medical center. Because day care staff already were in place, no additional salaries were required for their efforts, nor were there costs for the use of the day care facilities. Transportation expenses between the centers could not be calculated because trip, not mileage logs, were maintained.

## Discussion

The results of the investigation have limited generalizability but they do indicate that the

screening method is feasible with specific modifications. The major limitations of the investigation were that day care staff were not consistently able to conduct the screenings proficiently or efficiently, the cost analysis did not include the mileage incurred by the nurse's traveling between sites when screenings were being conducted simultaneously, the dental referral criteria contributed to overreferrals, and not all families provided information on their social position.

Parents were generally cooperative. Only a small percentage failed to complete followup or give information on their social position. The fact that families of children at both facilities were distributed across all social positions suggests that the intervention method is appropriate for use in early childhood programs. Also, the fact that verified problems occurred in families in the third and fourth social positions, who typically do not qualify for the legislated screening services, as well as families in the first and second social positions, suggests that children from all social groups should have access to screening services. Further, physicians were cooperative and did not view the activity as an infringement into their areas of practice.

The centers' staffs viewed the screening activities as acceptable, but the directors did not respond by initiating changes in policies, practices, or procedures partly because of the fiscal implications. Some recommendations for change were in critical areas that would reduce risks to health and increase the health-promoting features of their programs without necessarily increasing program costs. Examples are ensuring that staff adopt hygienic measures, particularly for diapering and toileting, isolate ill children, and monitor caregivers for inappropriate behaviors and children for signs of abuse. These should be among the minimal expectations for early childhood programs, yet they are not completely addressed in the State guidelines for day care facilities or the Standards for Day Care Centers of the American Academy of Pediatrics.

The health promoting needs that were identified in these two centers would not necessarily be limited to or be the same for all day care centers or all early childhood programs. Therefore, an essential component of a large-scale screening program would be the use of health providers, namely nurses—knowledgeable in the health needs of children and families, child health care practices, and child development and skilled in health needs assessment—who can appropriately identify

most existing health care needs in early childhood programs.

The referral rates were acceptable for all screenings except dental status. The difficulty is in distinguishing a discoloration from decalcification. Because of this problem dental authorities recommend referral of all children with discolorations, knowing that overreferrals may occur. If overreferrals are problematic, the criteria could be revised to refer only children with obvious decalcification, but alternately the revised criteria might increase the number of children with decalcification who would be missed and therefore might not receive care.

Contributing to the cost of the screenings was the followup of all identified problems—simultaneously one of the most difficult and important tasks when conducting screening activities. The costs per child, and in particular, the costs per problem identified, were higher than necessary because day care staff assisted the nurse in screening. Although most of the interrater reliabilities were acceptable, use of a screening aide to work with the nurse should improve interrater results and efficiency and decrease overreferrals and costs.

It was conservatively estimated that the time expended by the nurse for training staff, conducting rescreens, supervising day care staff on a one-to-one basis, and making trips between facilities could be reduced by as much as 50 percent. An estimated \$217 in project costs could be saved by substituting for day care staff a nonprofessional screening aide paid \$5 per hour and decreasing the amount paid to the nurse. This sum should convert to substantial savings in a large-scale screening program. It would decrease the time higher salaried personnel, such as nurses, spend in screening activities and would increase the number of children who could be screened within a specific period. An aide would be more proficient than day care staff so that a greater number of children could be screened per day. An aide skilled in all the screening routines could perform the more difficult tests such as vision and hearing; educate staff in measuring height, weight, and head circumference and supervise these screenings; and record and interpret the results of the screenings. The aide would be rotated through the screening sites.

Although the overall costs of this study were higher than desired to make this project economically feasible, comparisons with the costs of other screening programs indicate that this method

should be cost-effective. The costs per child screened in similar programs have been reported to range from \$8 to \$66 (12, 23, 33-35). However, our method was more comprehensive than the others described, which contributed to its costs.

Among the major differences were (a) our protocol had no financial eligibility requirements and was designed to make it possible to screen children under 6 in early childhood programs several times before they entered kindergarten, (b) children did not need to be transported to screening sites, (c) screenings were limited to the prevalent health problems in children under 6 years, (d) very time-consuming referral and followup procedures were an integral part of the program, and (e) assessments of the centers' environment, policies, practices, and procedures were included.

Other factors also contributed to the costs. For instance, children under 6 years require greater quantities of time for accurate measurements than older children or adults. The time available for day care staff to conduct screenings was inadequate and interspersed with their usual work routine, which contributed to inaccuracies. Because the numbers of persons conducting screenings were too great for accuracy and efficiency, a greater amount of the nurse's time was required for supervision and rescreening than would otherwise be necessary. Also, many children attended only 2 or 3 days per week, so that additional trips to each facility were required to screen all children.

Definitive conclusions cannot be formulated because of the limited scope of this investigation. However, our results suggest that day care centers might not voluntarily undertake health-promoting improvements in their operations, that guidelines governing licensing need to be strengthened, and that licensure should be extended to all early childhood programs. When problems are identified that block the attainment of optimal health of children in licensed early childhood programs, unlicensed programs automatically evoke concern.

Additionally, a system of health services, such as was described in this paper, should be provided to the population attending early childhood programs.

These children have many preventable and identifiable health conditions with long-term consequences for their future well-being. The present scope of health services in these programs reflects inequitably delivered services. The screening method we discuss appears feasible; however, further study is recommended. We subsequently designed an experimental study, using an experi-

mental and control group of 40 day care centers, which incorporates the modifications suggested in this paper, and we are seeking funding for this study.

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